Optimum sulfur amino acid to lysine ratio for weaner pigs infected with enterotoxigenic E. coli.

Capozzalo, M.M.; Resink, J.W. ; Htoo, J.K.; Kim, J.C.; de Lange, C.F.M.; Hansen, Christian Fink

Publication date:
2014

Document version
Early version, also known as pre-print

Abstracts

ASAS Midwestern Section and ADSA® Midwest Branch

March 17-19, 2014
Des Moines, Iowa

American Society of Animal Science
Journal of Animal Science
Volume 92, Supplement 2

American Dairy Science Association
Journal of Dairy Science
Volume 97, Supplement 1

American Dairy Science Association®
MIDWEST
American Society of Animal Science

091 **Optimum sulfur amino acid to lysine ratio for weaner pigs infected with enterotoxigenic *E. coli*.** M. M. Capozzalo[1,*], J. W. Resink[2], J. K. Htoo[3], J. C. Kim[4], C. F. M. de Lange[5], C. F. Hansen[6], B. Mullan[4], J. Pluske[1], [1]*Murdoch University, Western Australia, Australia,* [2]*Nutreco, Boxmeer, Netherlands,* [3]*Evonik Industries AG, Hanau-Wolfgang, Germany,* [4]*Department of Agriculture and Food, Western Australia, Australia,* [5]*Department of Animal and Poultry Science, University of Guelph, Guelph, ON, Canada,* [6]*Department of Large Animal Sciences, University of Copenhagen, Copenhagen, Denmark.*

This experiment tested the hypothesis that pigs challenged with an enterotoxigenic strain of *E. coli* (ETEC) have higher requirements for sulfur amino acids (SAA). Pigs (n = 120) weighing 7.4 ± 0.05 kg (mean ± SE) weaned at 27 d (Top-PIE genotype, mixed sex) were stratified into one of 6 treatments (n = 20). Five diets were formulated with increasing ratios of standardized ileal digestible (SID) SAA:Lys (analyzed levels 0.47, 0.55, 0.61, 0.68, and 0.76). Pigs were housed in pens of 4 during an adaptation period of 6 d after which time pigs were housed individually. Pigs fed different SAA:Lys levels were infected with ETEC (5 mL, 1.13×10^8 CFU/mL, serotype O149:K91:K88) on d 8, 9, and 10 after weaning. One group of pigs fed the diet containing 0.55 SAA:Lys, which is indicative of current NRC (2012) recommendations, was not infected. Pigs were fed Phase 1 diets (10.2 MJ NE and 1.2% SID Lys) ad libitum until d 15 after weaning. Phase 2 diets (10.2 MJ NE and 1.1% SID Lys) were fed ad libitum for the following 3 wk. Diets did not contain any antimicrobials. Data were analyzed using GLM procedures (SPSS v. 20) with BW at d 6 included as a covariate. Data for uninfected pigs were combined with infected pigs fed the same level of SAA:Lys, as both groups succumbed equally to edema disease. Average daily gain (ADG) was lower in pigs fed 0.47 SAA:Lys than pigs fed higher ratios for d 7 through 15 (P = 0.028). Pigs fed 0.47 SAA:Lys had lower ADG during d 30 through 36 than pigs fed SAA:Lys greater than 0.61 (P = 0.033). Positive linear effects were found for ADG during d 30 through 36 (P = 0.009) and d 7 through 36 (P = 0.011), and a quadratic effect was found for ADG during d 7 through 15 (P = 0.012) and d 7 through 36 (P = 0.008). There were no differences ($P > 0.05$) in feed intake. Feed efficiency (FE) was poorer in pigs fed 0.47 SAA:Lys than pigs fed higher ratios for d 7 through 15 ($P < 0.007$) and d 7 through 36 ($P < 0.001$). The FE improved with increasing SAA:Lys both linearly and quadratically for d 7 through 15 ($P < 0.05$) and d 7 through 36 ($P < 0.005$). These results suggest that for optimum production in disease-challenged pigs after weaning, the SID SAA:Lys requirement is likely to be above the current NRC (2012) recommendation of 0.55.

Key Words: *E. coli*, pig, sulfur amino acid, weaner

092 **Effect of dried distiller grains with solubles (DDGS) feeding strategies on growth and feed intake responses of immunologically castrated pigs harvested at 9, 7, or 5 wk post–second Improvest dose.** E. K. Harris[1,*], M. A. Mellencamp[2], L. J. Johnston[3], G. C. Shurson[1], [1]*University of Minnesota, St. Paul,* [2]*Zoetis, Inc, Florham Park, NJ,* [3]*West Central Research and Outreach Center, University of Minnesota, Morris.*

Few studies have evaluated growth performance responses when feeding DDGS diets to immunologically castrated pigs. To determine ADG, ADFI, and G:F during the growing–finishing period, entire male pigs (n = 863; initial BW = 21.5 kg) were weighed at 8 wk of age (WOA), randomly assigned to dietary treatments, and harvested at 9 (TD9), 7 (TD7), or 5 (TD5) wk post–second dose of Improvest (gonadotropin releasing factor analog– diphtheria toxoid conjugate; Zoetis, Inc., Florham Park, NJ) in a 4 × 3 factorial arrangement (n = 8 pens/treatment). A 4-phase feeding program (phase 1 = 3 wks, phases 2 and 3 = 4 wks each, and phase 4 = 5 wks) was used for each dietary treatment: positive control (PCon; 0% DDGS in all dietary phases), DDGS step down (SD; 40, 30, 20, and 10% DDGS in the 4 dietary phases, respectively), DDGS withdrawal (WD; 40% DDGS in phases 1 to 3 and 0% DDGS in phase 4), and negative control (NCon; 40% DDGS in all dietary phases). The first subcutaneous Improvest injection was administered at 11 WOA followed by the second dose at 15, 17, or 19 WOA. All pigs were harvested at 24 WOA. Pig BW and feed disappearance were determined at the beginning and end of each dietary phase and after 2 wk in phases 2 to 4. Overall, ADFI tended to be greater ($P \leq 0.10$) in WD-TD9 and PCon-TD9 pigs compared with NCon-TD9 pigs (2.44 and 2.45 vs. 2.31 ± 0.08 kg/d). Overall G:F was improved ($P \leq 0.05$) in pigs fed PCon and SD compared with pigs fed WD and NCon (0.427 and 0.424 vs. 0.414 and 0.413 ± 0.005). For all TD treatments, ADFI increased ($P \leq 0.05$) rapidly post–second Improvest dose and was greater ($P \leq 0.05$) in TD9 compared with TD5 pigs during the 17 to 19 (2.95 vs. 2.48 ± 0.10 kg/d) and during the 19 to 21 (3.25 vs. 2.84 ± 0.10 kg/d) WOA intervals. Overall G:F was improved ($P \leq 0.05$) in TD5 pigs compared with TD9 pigs (0.428 vs. 0.413 ± 0.005). Among all TD treatments, G:F was not different between the 2-wk periods before and after the second Improvest dose. Effects of diet and harvest time post–second dose of Improvest acted independently to influence G:F. Using the SD feeding strategy resulted in similar G:F compared with pigs fed PCon.

Key Words: DDGS, growth, Improvest